

We claim,

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1. A method for imaging tumor vasculature in a mammal, comprising:
- a) administering to the mammal a composition which comprises a molecule capable of detecting ephrin-B2 nucleic acid or polypeptide coupled to an imaging agent;
- b) allowing the composition to accumulate at the tumor vasculature; and
- c) detecting the accumulated composition so as to image the tumor vasculature.
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2. The method of claim 1 wherein the ephrin-B2 and the molecule capable of detecting ephrin-B2 are nucleic acids.
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3. The method of claim 1 wherein the ephrin-B2 and the molecule capable of detecting ephrin-B2 are polypeptides.
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4. The method of claim 1 wherein the accumulated composition is detected by a conventional scintillation camera, a gamma camera, a rectilinear scanner, a PET scanner, a SPECT scanner, a MRI scanner, a NMR scanner, an X-ray machine, or an infrared scanner machine.
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5. The method of claim 1 wherein the imaging agent is a radionuclide or a chelate.
6. A method of causing tumor cell death by targeting tumor vasculature comprising administering to a mammal a composition which

comprises a molecule capable of detecting ephrin-B2 nucleic acid or polypeptide coupled to an agent capable of causing tumor cell death.

7. A method of causing vascular endothelial cell death by targeting
5 tumor vasculature comprising administering to a mammal a composition which comprises a molecule capable of detecting ephrin-B2 nucleic acid or polypeptide coupled to an agent capable of causing vascular endothelial cell death.

8. The method of claim 6 wherein the ephrin-B2 and the molecule capable of detecting ephrin-B2 are nucleic acids.

9. The method of claim 7 wherein the ephrin-B2 and the molecule capable of detecting ephrin-B2 are nucleic acids.

10. The method of claim 6 wherein the agent capable of causing tumor cell death is carboplatin, cisplatin, vincristine, methotrexate, paclitaxel, docetaxel, 5-fluorouracil, UFT, hydroxyurea, gemcitabine, vinorelbine, irinotecan, tirapazamine, or matrilysin.

11. The method of claim 6 wherein the ephrin-B2 and the molecule capable of detecting ephrin-B2 are polypeptides.

12. The method of claim 7 wherein the ephrin-B2 and the molecule capable of detecting ephrin-B2 are polypeptides.

13. The method of claim 7 wherein the agent capable of causing vascular endothelial cell death is gelonin, ricin A, ricin B, saporin, bryodin

1, bryodin 2, momordin, pokeweed antiviral protein from seeds (PAP-S), trichokirin, or abrin.

14. The method of claim 1, 6, or 7 wherein the mammal is a human.

15. The method of claim 1, 6, or 7 wherein the molecule capable of detecting ephrin-B2 polypeptide is a monoclonal antibody, an antibody fragment, or a single chain fv.

16. The method of claim 1, 6, or 7 wherein the molecule capable of detecting ephrin-B2 polypeptide is an EphB1-Fc, EphB2-Fc, EphB3-Fc, or EphB4-Fc receptorbody polypeptide or an EphB1-Fc, EphB2-Fc, EphB3-Fc, or an EphB4 receptor fragment polypeptide containing an ephrin-B2 binding domain.

17. The method of claim 1, 6, or 7 wherein the composition is administered to a mammal with a carrier suitable for parenteral administration.

18. The method of claim 17 wherein the mammal is a human.

19. The method of claim 2, 8, or 9 wherein the molecule capable of detecting ephrin-B2 nucleic acid is an mRNA.

20. The method of claim 2, 8, or 9 wherein the molecule capable of detecting ephrin-B2 nucleic acid is a synthetic oligonucleotide.

21. The method of claim 3, 11, or 12 wherein the molecule capable of detecting ephrin-B2 polypeptide is a synthetic polypeptide.

22. A kit for imaging tumor vasculature in a mammal comprising a composition which comprises a molecule capable of detecting ephrin-B2 nucleic acid or polypeptide coupled to an imaging agent.

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23. The kit of claim 22 wherein the ephrin-B2 and the molecule capable of detecting ephrin-B2 are nucleic acids.

24. The kit of claim 22 wherein the ephrin-B2 and the molecule capable of detecting ephrin-B2 are polypeptides.

25. A kit for targeting tumor vasculature in a mammal comprising a composition which comprises a molecule capable of detecting ephrin-B2 nucleic acid or polypeptide coupled to an agent capable of causing tumor cell death.

26. A kit for targeting tumor vasculature in a mammal comprising a composition which comprises a molecule capable of detecting ephrin-B2 nucleic acid or polypeptide coupled to an agent capable of causing vascular endothelial cell death.

27. The kit of claim 25 wherein the ephrin-B2 and the molecule capable of detecting ephrin-B2 are nucleic acids.

28. The kit of claim 26 wherein the ephrin-B2 and the molecule capable of detecting ephrin-B2 are nucleic acids.

29. The kit of claim 25 wherein the ephrin-B2 and the molecule capable of detecting ephrin-B2 are polypeptides.

30. The kit of claim 26 wherein the ephrin-B2 and the molecule capable of detecting ephrin-B2 are polypeptides.

5 31. The kit of claim 22, 25, or 26 wherein the molecule capable of detecting ephrin-B2 polypeptide is a monoclonal antibody, an antibody fragment, and a single chain fv.

32. The kit of claim 22, 25, or 26 wherein the molecule capable of detecting ephrin-B2 polypeptide is an EphB4-Fc receptorbody polypeptide or an EphB4 receptor fragment polypeptide containing an ephrin-B2 binding domain.

33. The kit of claim 22, 25, or 26 wherein the composition is administered to a mammal with a carrier suitable for parenteral administration.

34. The kit of claim 33 wherein the mammal is a human.

20 35. The kit of claim 23, 27, or 28 wherein the molecule capable of detecting ephrin-B2 nucleic acid is an mRNA.

36. The kit of claim 23, 27, or 28 wherein the molecule capable of detecting ephrin-B2 nucleic acid is a synthetic oligonucleotide.

25 37. The kit of claim 24, 28, or 30 wherein the molecule capable of detecting ephrin-B2 polypeptide is a synthetic polypeptide.

38. A method of delivering an agent to the vasculature of a mammal comprising administering to the mammal a composition which comprises a molecule capable of localizing to a cell expressing ephrinB2 polypeptide, wherein the molecule is coupled to the agent.

39. The agent of claim 38 which is capable of stimulating angiogenesis.

40. The agent of claim 38 which is capable of preventing restenosis of a blood vessel.

41. The agent of claim 38 which is capable of dissolving a blood clot in a blood vessel.

42. The agent of claim 38 which is capable of reducing atherosclerotic plaques.

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